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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/526,843	03/03/2005	Chenghui Luo	fraunh01.049	9357

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EXAMINER

GYORFI, THOMAS A

ART UNIT	PAPER NUMBER
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2135

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/526,843	Applicant(s) LUO, CHENGHUI	
	Examiner Thomas Gyorfi	Art Unit 2135	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-29 is/are pending in the application.
4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-29 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>3/3/05 and 8/15/05</u> . | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

1. Claims 1-29 are pending examination.

Specification

2. The title of the invention is not properly descriptive.¹ A new title is required that is clearly indicative of the invention to which the claims are directed. The following title is suggested: PROTECTING MOBILE CODE AGAINST MALICIOUS HOSTS.

Information Disclosure Statement

3. The information disclosure statement (IDS) submitted on 3/3/05 and 8/15/05 have been considered by the Examiner.²

Claim Rejections - 35 USC § 101

4. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

5. Claims 1-5 and 22-29 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. Claims 1-5 are directed toward "code", i.e. software *per se*, which is not recognized as any of the statutory categories of invention. Furthermore, it is additionally observed that the code is intended for execution in a "program execution environment", such as the Java platform in the preferred embodiment (page 1, lines 25-30); the Java platform is itself preferably embodied as a virtual machine, which is itself software *per se* and therefore the claims cover embodiments that are fully intangible. Additionally, even if the code were tangibly embodied somehow within a host computer system,

¹ Prior to this Office Action, the title of the instant application was formally recorded as "PROTECTING MOBILE CODE AGAINST MALICIOUS HOSTS CROSS REFERENCE TO RELATED APPLICATIONS". Examiner merely wishes to officially correct this typographical error.

² In the IDS of 8/15/05 Applicant may have erroneously cited U.S. Patent 5,553,752 to Foster, in lieu of U.S. Patent 5,530,752 to Rubin as would be suggested by the PCT/US00/13128 search report.

the code does not itself perform any novel and non-obvious function, but rather the alleged novelty of the claimed invention lay in the manner by which the code is encoded (the encryption, obfuscation, and watermarking limitations of the claims) by some unclaimed component.³ The claims are thus directed to *non-functional* descriptive material, which cannot be made statutory merely by reciting that it is recorded on some computer-readable medium since no requisite functionality is present to satisfy the practical application requirement. Merely claiming nonfunctional descriptive material, i.e., abstract ideas, stored on a computer-readable medium, in a computer, or on an electromagnetic carrier signal, does not make it statutory. See *Diamond v. Diehr*, 450 U.S. 175, 185-86, 209 USPQ at 8 (noting that the claims for an algorithm in *Benson* were unpatentable as abstract ideas because “[t]he sole practical application of the algorithm was in connection with the programming of a general purpose computer.”). Such a result would exalt form over substance. *In re Sarkar*, 588 F.2d 1330, 1333, 200 USPQ 132, 137 (CCPA 1978) (See also MPEP 2106.01). Similarly, claims 22-29 are rejected as it appears from the preamble that the protected program may be executed either by the host computer system or the program execution environment [the virtual machine]; as the latter is non-statutory subject matter as discussed above, thus the claim encompasses non-statutory subject matter and is itself non-statutory..

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

³ A “Hello World” Java program thusly encoded would be equally meritorious of patent protection as any other Java program that may produce a new and useful result, under the current claim language.

7. Claims 1-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over “A Practical Method for Watermarking Java Programs” from the IDS filed 8/15/05 (hereinafter, “Monden”) in view of “Software DisEngineering: Program Hiding Architecture and Experiments” (hereinafter, “Valdez”).

Regarding claim 1:

Monden discloses code comprising: one or more obfuscated names that correspond to system symbolic names (page 192, “3.1 Current solutions for program theft”, third paragraph); a first association between the obfuscated names and other forms of the corresponding symbolic names (page 194, Figures 4 & 5); a static watermark that has been added to the code (Ibid, and “Watermark injection”); the execution environment including a second association of the forms with information needed to resolve the corresponding system symbolic names, using the first and second associations to resolve the obfuscated names, and using the static watermark to determine the authenticity of the code (Ibid, and page 195, “Decoding Procedure”).

Monden does not explicitly disclose that any of the corresponding system symbolic names are encrypted. However, Valdez discloses a number of techniques for preventing reverse engineering of software for illegal uses (page 1, “Introduction”; cf. Monden, page 1, “Introduction”) wherein information in a program, including symbolic information can be encrypted to obscure it (pages 386-387, “5.2 Execution Credential and Descrambling”; and Tables 1-5). It would have been obvious to encrypt symbolic information in a Java program as part of the watermarking process disclosed by Monden, because the encryption technique(s) disclosed by Valdez were part of the ordinary capabilities of one of ordinary skill in the art, in view of the teaching of the technique(s) for improvement in related situations.

Regarding claims 6 and 14:

Monden teaches an improved class loader (class loaders in general being an inherent component to Java) and method comprising: using the first association and a second association between the forms and information used to resolve the symbolic names defined in the class to resolve the symbolic names in a program (pages 194-195, including Figures 4-8); and adding a method to the program which determines whether the program has been modified by the host (page 194, "Dummy method injection").

Monden does not explicitly disclose that any of the corresponding system symbolic names are encrypted. However, Valdez discloses a number of techniques for preventing reverse engineering of software for illegal uses (page 1, "Introduction"; cf. Monden, page 1, "Introduction") wherein information in a program, including symbolic information can be encrypted to obscure it (pages 386-387, "5.2 Execution Credential and Descrambling"; and Tables 1-5). It would have been obvious to encrypt symbolic information in a Java program as part of the watermarking process disclosed by Monden, because the encryption technique(s) disclosed by Valdez were part of the ordinary capabilities of one of ordinary skill in the art, in view of the teaching of the technique(s) for improvement in related situations.

Regarding claim 22:

Monden a method comprising: replacing symbolic names in the program that are defined in the class with obfuscated symbolic names corresponding thereto (page 194, "Watermark injection", and Figures 4-5); making a first association between the obfuscated symbolic names and forms of the replaces symbolic names (Ibid); making a second association between the forms of the symbolic names and information required to resolve the symbolic names (page 195, Figures 6-8); adding a method to the program that determines whether the program has been modified by the host (page 194, "Dummy method injection"); using the first and second associations to resolve the obfuscated symbolic names (page 195,

"Decoding Procedure") and executing the added method to determine whether the program has been modified by the host (Ibid).

Monden does not explicitly disclose that any of the corresponding system symbolic names are encrypted. However, Valdez discloses a number of techniques for preventing reverse engineering of software for illegal uses (page 1, "Introduction"; cf. Monden, page 1, "Introduction") wherein information in a program, including symbolic information can be encrypted to obscure it (pages 386-387, "5.2 Execution Credential and Descrambling"; and Tables 1-5). It would have been obvious to encrypt symbolic information in a Java program as part of the watermarking process disclosed by Monden, because the encryption technique(s) disclosed by Valdez were part of the ordinary capabilities of one of ordinary skill in the art, in view of the teaching of the technique(s) for improvement in related situations.

Regarding claims 2 and 10:

Monden further discloses wherein the static watermark's value is a digest of the code prior to the addition of the static watermark (Figure 6).

Regarding claims 3 and 23:

Valdez further discloses wherein other obfuscated names that replace names defined in source code from which the code was made (page 381, "Transformations").

Regarding claim 4:

Monden further discloses wherein the code is downloaded to the program execution environment for execution (e.g. Java applets on Internet sites, page 191).

Regarding claims 5, 13, 21, and 29:

Valdez further discloses wherein the program includes an encrypted form of the encryption key used to produce the second association (the session key, page 380), and the improved class loader obtains the

encryption key by using a decryption key to decrypt the encrypted form of the encryption key (decryption key, page 382).

Regarding claim 7:

Valdez further discloses wherein the method is encrypted prior to being added to the program and the improved class loader decrypts the method on adding the method to the program (page 388, "6.1 TCL Transformations", particularly 1st paragraph).

Regarding claim 8:

Monden further discloses wherein the program includes information from which the method determines whether the program has been modified by the host (page 194, "Dummy method injection")

Regarding claims 9, 17, and 26:

Monden further discloses wherein the program includes a static watermark (pages 194-195, "Watermark injection") and the static watermark is the information from which the method determines whether the program has been modified by the host (Ibid)

Regarding claims 11, 19, and 27:

Monden further discloses wherein the static watermark is at a location in the program determined by a key (Figures 6, 7, & 8) and the method has access to the key and uses the key to locate the static watermark (Ibid).

Regarding claims 12, 20, and 28:

Valdez further discloses wherein the improved class loader has access to an encryption key that was used to produce the encrypted forms in the first association (pages 386-387, "5.2 Execution Credential and Descrambling"); and the improved class loader uses encryption key to produce second association on loading the class (Ibid).

Art Unit: 2135

Regarding claims 15 and 24:

Valdez further discloses wherein the added method is encrypted (pages 386-387, “5.2 Execution Credential and Descrambling”; cf. Tables 1-5); and the step of adding the method includes the step of decrypting the method (Ibid).

Regarding claim 16:

Monden further discloses wherein the program includes information which the added method uses to determine whether the program has been modified by the host (the watermark: see page 195, including “4.2 Decoding Procedure”).

Regarding claim 18:

Monden further discloses wherein the static watermark’s value is a digest of the code prior to the addition of the static watermark (Figure 6) and wherein the added method reads the static watermark, recomputes the digest, and compares the recomputed digest with the watermark’s value (page 195 “Decoding procedure”).

Regarding claim 25:

Monden further discloses wherein the program includes information which the added method uses to determine whether the program has been modified by the host (the watermark: see page 195, including “4.2 Decoding Procedure”) and in the step of executing the added method, the added method uses the information to determine whether the program has been modified by the host (Ibid).

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

- U.S. Patents 5,530,752; 7,305,704; and 7,343,619
- U.S. Pre-grant Publications 2003/0177374, 2003/0177381, and 2003/0177391

Art Unit: 2135

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thomas Gyorfi whose telephone number is (571)272-3849. The examiner can normally be reached on 8:30am - 5:00pm Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kim Vu can be reached on (571) 272-3859. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

TAG
3/25/08

/KIMYEN VU/
Supervisory Patent Examiner, Art Unit 2135